

THESIS

BARRIERS TO CERTIFICATION FOR LEED REGISTERED PROJECTS

Submitted by

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WE HEREBY RECOMMEND THAT THE THESIS PREPARED UNDER OUR SUPERVISION BY BRADLY T. JOHNSON ENTITLED BARRIERS TO CERTIFICATION FOR LEED REGISTERED PROJECTS BE ACCEPTED AS FULLFILING IN PART REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE.

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ABSTRACT FOR THESIS

BARRIERS TO CERTIFICATION FOR LEED REGISTERED PROJECTS

Conventional building methods are continuing to strain the supply of available resources and harm the environment (USGBC, nd). Green building practices are perceived by many construction industry professionals to be part of the solution to these problems. In an effort to define what constitutes a green building, the United States Green Building Council (USGBC) developed the Leadership in Energy and Environmental Design (LEED) Rating System to evaluate buildings' level of sustainability and to reward projects that achieve specified levels of sustainability (U.S. Green Building Council, 2000).

Early LEED registered projects were studied to determine reasons for, and barriers to, LEED certification. Reasons for LEED certification included: environmental stewardship, maintain green building as a project priority, and owner requirement. Barriers to certification included: problems with the LEED documentation process, a lack of education, and costs associated with LEED.

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Introduction and Background

Introduction

The green/sustainable building movement constitutes a change in the way construction is performed. It affects the methods and materials used and also the process in which buildings are constructed, from planning stages through the warranty. Many in the industry have made claims of building green or using sustainable practices but have had no way to validate this achievement. In an effort to set a standard for what constitutes a green building, the United States Green Building Council (USGBC) developed The Leadership in Energy and Environmental Design (LEED) Certification (U.S. Green Building Council, 2000). Many stakeholders in the construction industry have chosen to employ this certification process to validate their achievement of building green. Yet, it appears that a number of project teams stop short of LEED certification. This study investigated some of the reasons that projects register for LEED certification and some of the barriers to achieving certification. Additionally the study examined some differences that exist between LEED registered projects that become certified and those that do not.

Green Building

Within the green building community there are several terms used to discuss the same set of general ideas. The list includes: green building, green development, environmental building, sustainable design, sustainable development, and sustainable building. Each of these terms may have a slightly different connotation but the general goals and ideas remain the same. The Whole Building Design Guide Sustainable Committee (n.d. Sustainable section) realized this when they wrote:

While the definition of what constitutes sustainable building design is constantly changing, there are six fundamental principles that nearly everyone agrees on.

- Optimize Site Potential

Creating sustainable buildings starts with proper site selection, including consideration of the reuse or rehabilitation of existing buildings. The location, orientation, and landscaping of a building affect the local ecosystems, transportation methods, and energy use.

- Minimize Energy Consumption

A building should rely on conservation and passive design measures rather than fossil fuels

for its operation. It should meet or exceed applicable energy performance standards.

- Protect and Conserve Water

In many parts of the country, fresh water is an increasingly scarce resource. A sustainable building should reduce, control or treat site-runoff, use water efficiently, and reuse or recycle water for on-site use when feasible.

- Use Environmentally Preferable Products

A sustainable building should be constructed of materials that minimize lifecycle environmental impacts such as global warming, resource depletion, and human toxicity. In a materials context, lifecycle includes raw materials acquisition, product manufacturing, packaging, transportation, installation, use, and reuse/recycling/disposal.

- Enhance Indoor Environmental Quality (IEQ)

The indoor environmental quality (IEQ) of a building has a significant impact on occupant health, comfort, and productivity. Among other attributes, a sustainable building should maximize daylighting, have appropriate

ventilation and moisture control, and avoid the use of materials with high-VOC emissions.

- Optimize Operational and Maintenance Practices

A sustainable building should be designed to take into account the energy and environmental impacts of operating and maintaining the building.

Designers are encouraged to specify materials and systems that reduce the need for maintenance, and/or require less water, energy, and toxic chemicals and cleaners to maintain. (¶4)

The authors of the book *Green Development: Integrating Ecology and Real Estate* (Wilson, A., Uncapher, J. L., McManigal, L., Lovins, H. L., Cureton, M., & Browning, W. D. 1998,) have divided the elements of green development and design into three categories:

- Environmental responsiveness

A big part of environmental responsiveness is optimizing site potential. It is important to look at all environmental impacts of a building and ensure that negative impact is minimized.

There is even the potential that there may be an opportunity for ecological restoration within the design of the development.

- Resource efficiency

Resource efficiency is the process of doing more with less—using fewer (or less scarce resources) to accomplish the same goals. Resource efficiency can be applied to many aspects of the building process, including: building design, material selection, waste reduction, water conservation, and energy efficiency.

- Community and cultural sensitivity.

This category applies to the social aspect of building. Included in this is developing so as to encourage a sense of community. This means taking into account meeting places such as parks common areas, porches and the like. A designer who is sensitive to this category will recognize that the building will become a part of the community. Cultural sensitivity takes into account the history, culture and existing motif of the community. It means building to fit or blend into the community.(p.6)

The authors of the *LEED Reference Guide Version 2.0* are in agreement with these divisions (USGBC, 2000).

When 'green' is the goal, whole building engineering is one of the most important factors. Whole building engineering is accomplished when the designers and engineers look at all of the components and aspects of a building, including the site, and determine how they will best work together. Lovins and Browning (1992) assert that designers and engineers are neither accustomed to, nor rewarded for, whole building engineering. Considerable time and effort is expended when this holistic approach is employed. Designers and engineers, in the interest of time and money, often take a one-size-fits-all approach instead of looking at the uniqueness of each building's design and intended use.

The Need

The answer to the question "Why develop or build green?" is found in identified problems with conventional building practices and how green building practices work to solve these problems. Following are a few ideas presented to make a case for green building.

Resource consumption

Buildings are a major source of resource consumption. This consumption has been estimated to be 40% of raw materials globally, which calculates to three billion tons annually (Roodman & Lenssen 1995). Not only are resources

being consumed by our buildings, but the construction industry generates large amounts of waste. In the U.S. in 1996, it was estimated that 136 million tons of construction and demolition waste was generated, which equals approx. 2.8 lbs/person/day (U.S. EPA 1998). Green building techniques attempt to help solve these problems by employing practices such as using materials that are sustainable (able to be regenerated as fast, or faster than they are used), and by recycling, which reduces waste and raw materials usage (Barnett & Browning, 1995).

Energy consumption

Currently we are building structures that consume a large portion of the energy produced in this country. Buildings alone account for 65.2% of total U.S. electricity consumption and greater than 36% of total U.S. primary energy use (U.S. Department of Energy, 2001). A large portion of this energy is used in the heating and cooling of buildings. Electricity used for lighting and to run equipment such as the refrigerator, clothes dryer, and office equipment make up another large portion (Lovins & Browning, 1992). Saving one unit of electricity saves three or four units of fuel at the power plant. Power plants use one-third of all fuel, thus producing one-third of the resulting carbon dioxide (CO₂), one-third of

nitrogen oxides (NOx), and two-thirds of the sulfur oxides (SOx) (Lovins & Browning, 1992 p. 2). Green building practices can greatly reduce the environmental impact that buildings have on the environment by reducing the amount of energy needed to operate and maintain buildings.

Economics

There are economic reasons for building green. The two most predominant economic factors are reduced energy costs and increased productivity. In their article *Greening the building and the bottom line*, Romm and Browning (1994) present eight case studies that make a strong case that certain green building practices (efficient lighting, heating, and cooling) increase worker productivity, decrease worker absenteeism and/or improve the quality of work performed. These benefits, which positively affect a company's economic bottom line, are all in addition to saving money and resources through energy efficient design.

The U.S. Green Building Council (USGBC)

Since its formation in 1993, the USGBC has become a leading agency in the green building community. The USGBC defines itself through its mission statement:

The U.S. Green Building Council is the nation's foremost coalition of leaders from across the building industry working to promote buildings that are

environmentally responsible, profitable and healthy places to live and work" (USGBC, n.d.).

As of December 2004 the USGBC had over 5400 members. These members are placed in one of eleven categories:

- Building Product Manufacturers
- Building Owners, Managers, Users, and Brokers
- Financial and Insurance Firms
- Professional Societies
- Design, Architectural, Engineering and Technical Firms
- Contractors and Builders
- Environmental Groups
- Utilities
- Universities and Technical Research Institutes
- State, Local, and Federal Governments
- Building Control Service Contractors and Manufacturers

The USGBC was instrumental in bringing the green building community together.

The LEED Rating System

Shortly after the USGBC was created, it was determined that there was a need for a nationwide or even global standard for green building (USGBC, 2000). In response to this need the USGBC created the LEED Rating System for green buildings. The USGBC first introduced LEED for new

construction (LEED NC) and major remodels. Subsequently, rating systems are being developed for existing buildings, commercial interiors, neighborhoods, and homes. The LEED NC Rating System consists of six categories within which points can be earned. Each category with corresponding points for LEED NC is shown in table 1.

Table 1

LEED NC Rating Categories and Associated Points

Category	Points
Sustainable Sites	14
Water Efficiency	5
Energy & Atmosphere	17
Materials & Resources	13
Indoor Environmental Quality	15
Innovation & Design Process	5
Total	69

Adapted from LEED Reference Guide, 2000 P.9

Each category has several subcategories and corresponding points.

- *Sustainable sites:* This category has eight areas where credits or points may be earned. It deals with several issues including the site location, use, and restoration. Also included in this category is the placement of the building.

- *Water efficiency:* This category includes landscaping, wastewater, and water use reduction.
- *Energy and atmosphere:* Within this category are credits for features that reduce energy consumption, use renewable energy sources, and reduce the impact of the building on the environment including the reduction of hazardous waste.
- *Materials and resources:* The use of existing buildings, recycling, and the use of renewable materials is found in this category.
- *Indoor environmental quality:* This category deals with the issues of indoor air quality, thermal comfort, and daylighting.
- *Innovation and design process:* This last category is an area where points can be earned by design teams who are innovative in their design and have incorporated a sustainable practice that is not specifically covered in another category. Also included in this category is a point for having a LEED accredited professional on the design team. Detailed explanations of these categories along with point values for each can be found in the LEED Reference Guide.

There are four levels of LEED-NC certification depending on how many points are earned. These classification levels

make an attempt to classify buildings depending on their level of sustainability. Table 2 shows the certification levels for LEED-NC and the points required for each. The authors of a Rocky Mountain Institute publication have called the LEED rating system a "definitive standard" for what constitutes a green building (Rocky Mountain Institute, 2002).

Table 2

LEED-NC Certification Levels and Associated Point requirements

Certification level	Points earned
LEED Platinum	53 and up
LEED Gold	between 39 and 51
LEED Silver	between 33 and 38
LEED Certified	between 26 and 32

Note. A total of 69 points are possible. Adapted from LEED Reference Guide, 2000, P.9

LEED Certification Process

The process for a building to become certified takes time, effort, and money. The USGBC (USGBC, n.d.) has suggested several advantages for LEED certification as follows:

- Establish recognized leadership in the green building sector

- Validate achievement through third party review
- Qualify for a growing array of state and local government incentives
- Contribute to a growing green building knowledge base
- Earn LEED Certification plaque and certificate (¶2)

The first step in the process for projects to become certified is project registration. Registration involves providing the USGBC with project information by completing an online registration form. There is also a cost associated with registering a project. The cost of registration is based on the size of the building given in square feet. Table three shows the cost associated with LEED registration as of November 2004.

Table 3

Registration Fee Schedule

	Less than 75,000 Square Feet Fixed Rate	75,000 - 300,000 Square Feet Based on Square Ft.	More than 300,000 Square Feet Fixed Rate
Members	\$750.00	\$0.01 per Square Foot	\$3,000.00
Non-Members	\$950.00	\$0.0125 per Square Foot	\$3,750.00

Note. The information in this table was collected in November 2004 from the USGBC website.

Once a project becomes registered, the documentation process begins. As outlined above, there are six categories in which prerequisites are specified and credits can be earned. In order for a project to become certified, proof of each credit must be documented and approved by the USGBC. Because of the diversity among project types, questions often arise concerning the application of specific prerequisites and credits to a particular project. The USGBC has put in place a system to answer these questions. When questions arise, project teams can submit a credit interpretation request (CIR) to the USGBC. Once a ruling has been made on a specific CIR it is placed on a page for others to view and apply to pertinent projects.

The USGBC has suggested that a LEED accredited professional be the contact person on record with the USGBC for LEED projects and that they be a member of the team responsible for documentation (USGBC n.d.). A LEED accredited professional is a person who has shown some knowledge about green building and the LEED certification process. They have shown this competence by passing the LEED accredited professional examination.

Definition of Terms

There are several terms that will be clarified in order to understand the perspective of this study. The

term "green" or "sustainable" buildings will be used interchangeably within this study. For the purposes of this study, a building will be green or sustainable if it is LEED certified, meaning that it has earned at least 26 of the 69 points available through the LEED-NC certification process. A project or building will be registered if it has filed the paperwork and paid the fees to become registered for LEED certification with the USGBC. A project will be certified only if actual LEED certification has been granted by the USGBC.

Management Dilemma

Many in the construction industry are recognizing the need to develop and build in a way that is more environmentally responsible. This trend is evidenced by the growing number of projects that have registered for LEED Certification. As of December 2004 more than 1700 projects had been registered. The fact that a building is registered shows that at least one member, and probably several members, of the project team is interested in having the project certified. Additionally, project funds were committed to cover LEED registration costs.

The LEED Rating System was first introduced in August of 1998. Twelve projects completed the application for certification by March of 2000. Many changes have since

been made to the LEED Rating System. Several updated versions have been drafted and implemented. The USGBC continues to update and expand the LEED Rating System to meet the needs of the industry. Even though the LEED Rating System is gaining interest, little research has been done to explain some of the reasons for, and barriers to, certification. This research has attempted to broaden the body of knowledge surrounding the LEED certification process.

A review of the list of registered projects reveals that several projects have been completed for a considerable amount of time but have not been certified. This research investigates these and other early LEED projects in an effort to determine barriers to certification and identify some of the reasons projects become registered. The identification of barriers provides valuable information for those who will work toward LEED certification in the future. The identification of the underlying reasons for certification may help in understanding why project certification is not being completed.

Additionally the research attempts to identify some of the differences between projects that are successful in completing the certification process and those that are

not. The research also provides information about how the certification process may be improved to ensure that the process itself is not hindering the overriding goal of building green.

Limitations

This study is limited to those projects that have registered for LEED certification before January 1, 2002. For the purposes of this study, it was assumed that projects registered after this date would not have had sufficient time to be completed or LEED certified. Also, changes have been made to the LEED certification process and requirements since that date. Additionally, the projects included in this research are some of the first projects to attempt LEED certification. Lessons learned from these and other early projects may have had, or are having, an effect on the process for later projects. The research is also limited to the accuracy of statements and opinions formed by survey respondents.

The population consisted of 207 contact persons for projects registered for LEED before January 1, 2002. From this list of contact persons only 184 correct email addresses were obtained. From the 184 surveys that were sent out 43 were returned. Because of the small population

and the small number of respondents, no inference can be made to the population.

Statement of the Problem

Conventional building methods are continuing to strain the supply of available resources and harm the environment (USGBC, nd). Green building practices are perceived by many industry professionals to be part of the solution to this problem. In an effort to define what constitutes a green building, the USGBC developed the LEED Rating System to evaluate buildings' level of sustainability and to reward projects that achieve specified levels of sustainability.

Many in the construction industry have recognized the need to build or develop green and have decided to register their projects for LEED certification. Many of these LEED registered projects have been completed for a considerable amount of time but have failed to become certified. It is currently unknown if certification is still a goal for many of these projects, or if it is just taking more time than usual. It is also unknown if there are differences between registered projects that become certified and those that do not. The goal of this study is to understand some of the barriers to certification for LEED registered projects.

Research Questions

The questions addressed by this research project are as follows:

1. What are the motivations for LEED registered projects to become registered and eventually certified?
2. What are some of the encountered barriers for LEED registered projects to become certified?
3. What are some of the observed differences between registered buildings that receive certification and those that do not?

The researcher investigated these questions in an effort to learn more about some aspects of the process of LEED certification. This information may provide valuable information for project teams who will consider LEED certification in the future. The research may also provide information about how the certification process may be improved to ensure that the process itself is not hindering the overriding goal of building green.

Methodology

The population

The purpose of this study is to examine some aspects of the LEED certification process. Projects registered

before January 1, 2002 were included in this study. This date was chosen because it was assumed that projects registered later than this date may not have had sufficient time to complete either the project or the LEED certification process. Because several of these projects have the same contact person, the population for this study became LEED project contacts for projects registered with the USGBC before January 1, 2002. These contact persons were asked to answer the survey about the first LEED project for which they were the contact person.

Procedures

Using the information on the USGBC website, the researcher identified 236 projects that registered before January 1, 2002. Additionally, a contact person for each project was identified. Because several contact persons had more than one project that met this criteria, the subjects were asked to answer the survey questions for only the earliest project where they were to contact person. This was done so that no one person would be asked to complete more than one survey. This reduced the number of projects to 207. The population for this study thus became the contact persons for projects registered before January 1, 2002. Because of the relatively small population all members of the population were sent the survey. If the

email address listed on the USGBC website for a contact person was invalid, an attempt was made to identify a different email address for that contact person or identify another contact person from the USGBC website.

To increase the content validity of the survey, a pilot survey was sent to persons not included in the research population but currently working on LEED certification for other projects. Feedback was elicited from these individuals and the survey was changed based upon the feedback received. Additionally, early versions of the survey were reviewed by persons with experience concerning the LEED certification process, and changes were made based upon suggestions from these persons.

The instrument, as well as the methodology, was sent to the CSU Human Research Committee for approval. Once approval was granted and the population was identified, the survey was sent to the contact persons with relevant questions concerning the certification process and the motivations for project registration. Information was also gathered concerning the status of each project, specifically a completion date and certification date (if the project is certified).

For a portion of the analysis, the respondents were divided into two groups. One group consisted of the

surveyed projects that had been certified. The other group consisted of surveyed projects that have not, and are not planning to become certified. This was done to compare groups and help analyze the reasons for, and barriers to certification.

A cover letter outlining the research project and the known risks associated with participation was sent to each contact person via email. This cover letter had a link to the survey that was managed by an online service called Survey Monkey. One week after the original surveys were sent, a second request and cover letter was sent to individuals who had not responded to the original request. One week after this, a third request and cover letter was sent to individuals who had not responded to the original or second request. Surveys were accepted for one week following the third request. Upon the first mailing of the survey, 41 emails were returned as invalid. From these 41 projects 33 new addresses or contact persons were identified. Several of these new email addresses were also returned. There was no further attempt to identify a contact person for these projects that had invalid email addresses. A total of 184 correct addresses were found and surveys were sent to each. A total of 43 completed surveys were returned.

Instrumentation

A survey was the main instrument employed in the collection of data for this study. The survey was sent to each identified contact person as outlined previously. Several types of questions were present on the survey. There were multiple choice/single response, multiple choice/multiple response, likert scale, and short answer questions. The purpose of the questions was to identify characteristics of the respondent and the project and to identify reasons for, and barriers to, LEED certification. As stated earlier the research questions are as follows:

1. What are the motivations for LEED registered projects to become registered and eventually certified?
2. What are some of the encountered barriers for LEED registered projects to become certified?
3. What are some of the observed differences between registered buildings that receive certification and those that do not?

The survey was designed to answer these questions as well as collect some general information concerning the contact person. The survey along with the cover letter can be found in Appendix A.

Survey questions 1 and 3 through 7 were designed to collect general information about the project and survey respondent. Questions 20 and 22 were used to answer research question one. Questions 21 and 23 through 26 were used to answer research question two. Questions 2 and 8 through 23 were used to answer research question three.

Form of Data Collected

The data collected is primary data. It consists of the data gathered during the identification of the population sample and the data collected from the survey itself. Depending on the question, the data is numerical, categorical, or scaled. For the questions on the survey that are multiple choice, single, or multiple-response types, the answers are numerical, with each number representing a specific response. These responses will make up a majority of the data.

Treatment of the Data and Analysis

This study is exploratory in nature and is mostly qualitative with limited quantitative analysis. From the 184 surveys that were sent out, 43 were returned. Because of the small population and the small number of respondents, no inference was made to the population. The researcher used the data to answer the research questions for projects for which surveys were collected.

The data collected from the multiple choice and Likert scale questions were placed into SPSS for analysis. Descriptive statistics were used to describe and make sense of the data. The descriptive statistics included the frequency and mean for many variables. The two groups' design allowed for the use of some comparative analysis. In an effort to correctly designate the non-certified projects as non-certified, the researcher considered determining the mean time in days for projects to become certified from completion (300 days). Any project not completed and certified 300 days before the first day of data collection would not have been included in a comparison group. The first day of data collection was February 22, 2005. Three hundred days before this date is April 29, 2004. These criteria left only six cases to be included in the non-certified group, two of which stated that certification was still a goal. It was determined that a better way to divide the cases into groups was to designate the 8 cases that indicated that certification was no longer a goal as the non-certified group. To be clear, the non-certified cases that still had a goal to become certified were not included in the analysis for research question three. The analysis for this question was divided into two parts. The first part was done using the multiple

choice and Likert scale questions. The second part looked at the open-ended questions.

Many variables were examined to determine if differences exist between projects that achieved certification and those that had not and were not planning to certify. The data was also used to determine barriers for LEED certification and reasons for LEED registration and certification. Means and frequencies were used to rank these stated barriers and reasons. The data collected from the open-ended questions was coded by the researcher and interpreted using the frequency of the codes as an indicator of their significance.

Results

As part of this section, the survey questions will be mentioned and discussed. The complete survey has been included in Appendix A for reference and clarification. The raw data has also been included in Appendix B.

Characteristics of Respondents and Projects

Several survey questions were designed to collect information about the survey respondents. Respondents were asked to indicate which type organization they worked in. As seen in Figure 1, 20 of the respondents worked in an architectural firm; nine were the owner, or worked for the owner; six worked in a green building consulting firm; and

four worked for government agencies. The remaining respondents (one each) worked in general contracting, engineering, architecture/engineering, and engineering consulting firms. Another question asked respondents to indicate their involvement in the LEED documentation process. Twenty-seven of the respondents indicated that they were "responsible for LEED documentation", 14 indicated that they "participated in LEED documentation, and 2 were "not involved in LEED documentation". From the question that asked if the respondent was a LEED accredited professional, 31 of the respondents indicated that they were, and 12 indicated that they were not.

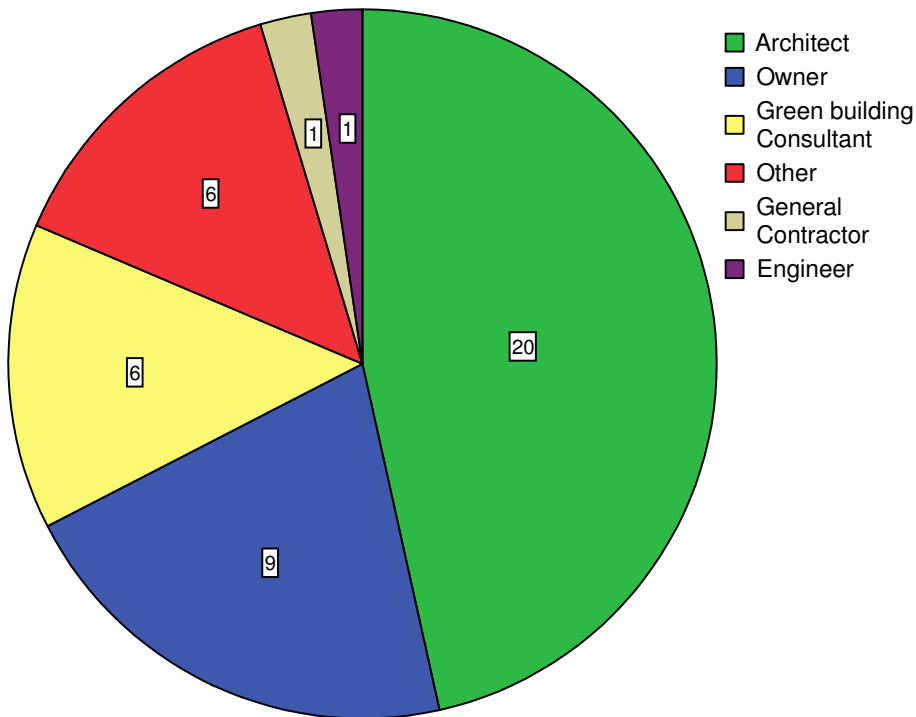


Figure 1 Type of organization that the respondent works for.

Questions were also asked about the specific projects under investigation. The data showed that 20 of the 43 surveyed projects had achieved certification. Data was also collected concerning the date of completion for these projects. It was determined from this information that the time from project completion to certification ranged from 0 to 852 days, with a mean of approximately 300 days. Table 4 Shows the frequencies and time durations for time from completion to certification. The data also showed that some of the projects had not been completed and thus would not have had a chance to become certified. Of the 23 projects that had not achieved certification, 14 indicated that certification was still a goal, 8 indicated that it was not, and one gave no indication.

Table 4

*Time Duration From Project Completion to LEED Certification
for Certified Projects*

Time in days	Frequency	Time in days	Frequency
0	2	303	1
47	1	317	1
116	1	334	1
120	1	365	1
127	1	397	1
137	1	594	1
183	1	624	1
192	1	795	1
236	1	852	1
259	1	Not Certified	20

Information concerning the size of the project, the end use of the project, and the location of the project was also collected. The majority of the projects (25) were smaller than 75,000 SF, 16 were 75,000 to 300,000 SF in size, and only 2 were larger than 300,000 SF. As seen in Figure 2, the end use for the majority of the projects was

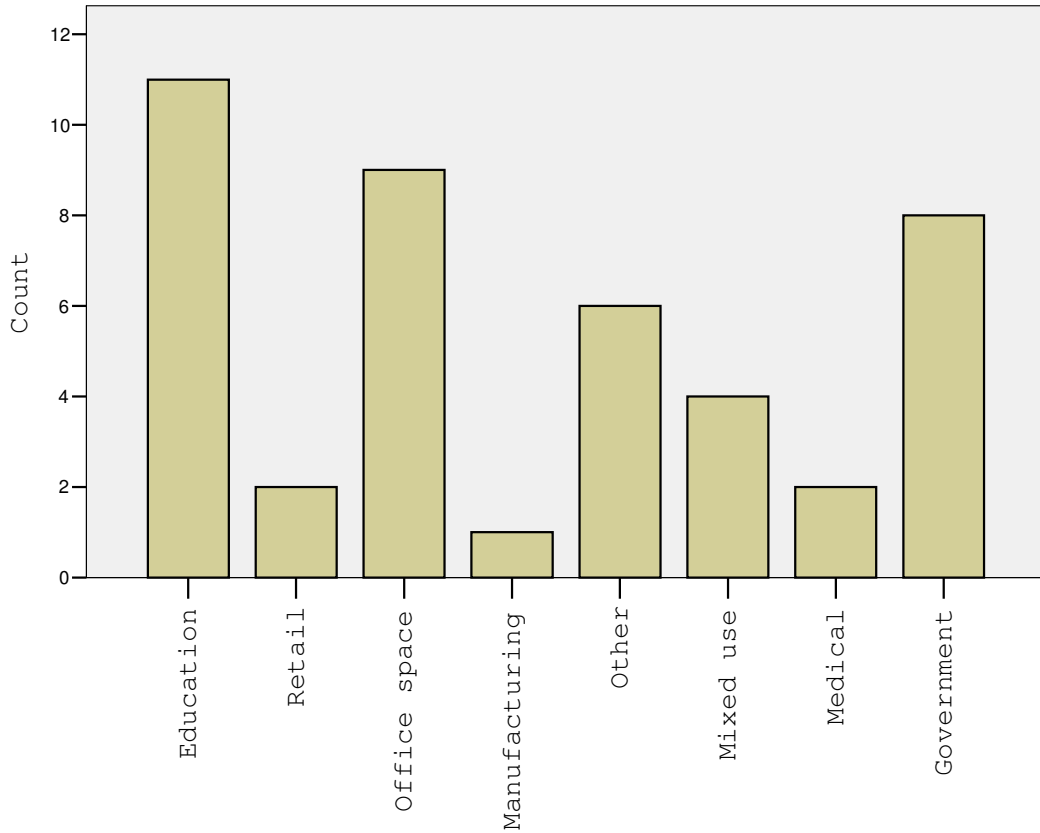


Figure 2. End use for surveyed projects.

education, office space, and government (11, 9, and 8 respectively). Other uses included retail, manufacturing, mixed use, medical, and "other". The surveyed projects were located in 26 different states within the United States. Seven of these 26 states had more than one surveyed project.

Additional information that was collected concerning the projects included: the organization initiating LEED registration and certification, the organization in charge of documentation, the number of organizations having LEED

accredited professionals working on the project, and the number of organizations working on the surveyed project who had worked on a previous LEED project. The organizations initiating certification for the majority of the projects were the owner and the architect (26 and 15 respectively). The organizations in charge of documentation for the majority of the projects were the architect and green building consultants (21 and 12 respectively). All projects had at least one LEED accredited professional working on the project with 19 having only one, 11 having two, 9 having three, and the rest having more than three. The organizations that had the majority of the LEED accredited professionals were the architects and consultants with 32 and 17 respectively. Sixteen of the surveyed projects had no organizations that had worked on a previous LEED project, 11 had one, 7 had two, 6 had three and the rest had more than three.

Research Question One

Two survey questions were designed to answer research question one: What are the motivations for LEED registered projects to become registered and eventually certified? The first was an open ended question that allowed respondents to state "the most compelling reason for working toward LEED certification for this project." The

second was a Likert scale question where respondents were asked to rate the importance of several different reasons for working toward LEED certification.

From the open ended question two major themes emerged, environmental stewardship and owner driven. Environmental stewardship (Mentioned 19 times) was the most often stated reason. Many stated that the idea of environmental stewardship was part of the core values the organization. Another frequently mentioned reason (16 respondents) was that the owner had a desire to achieve certification. The next two most frequently mentioned reasons were to establish a standard or set an example (6 respondents) and to save money through life cycle-costs (5 respondents). Table 5 shows the response codes for this questions and the number of times each was mentioned.

Table 5

Stated Reasons for Working Toward LEED Certification

Reason	Frequency
Environmental stewardship fits the values of the company	19
Owner Driven	16
To set a standard or example	6
Save money through life-cycle costs	5
Validate achievement through third party review	4
To have a good image	3
Improved environment for occupants	2
Improve the end result by using LEED (better product)	2
State and local government incentives	2
Did not respond	2
Profit opportunities by proving that the owner can design for LEED	1
To keep green building a project priority	1

The Likert scale question (See survey in Appendix A) was coded with 5 being "Most influential" and 1 being "No influence". Another response option was "NA" for those reasons that did not apply to a given project. The "NA"

response was given a code value of zero. The highest ranked reason for working toward LEED certification was environmental stewardship, $M = 4.33$. The next two highest ranked reasons were "to keep green building a project priority", $M = 3.88$ and "validate achievement through third party review", $M = 3.21$. These reasons and their average rankings can be seen in Table 6. For this question, respondents were also given an opportunity to include and rank an "Other" reason for working toward LEED certification. Five respondents utilized this option. The list with their corresponding rank includes:

- a. "Sustainable Future" (Most influential)
- b. "increase awareness and capacity within the building industry" (Very influential)
- c. "Increased comfort, health and productivity of building occupants" (not ranked)
- d. "Demonstrate care for occupants" (Very influential)
- e. "Our Project Team adopted the 'goal' of achieving LEED Certification and we kept encouraging one another during the whole process." (Very influential)

Table 6

Reasons for Working Toward LEED Certificaton

Reason	Mean	Standard deviation
Environmental stewardship	4.33	0.89
To keep green building a project priority	3.88	1.19
Validate achievement through third party review	3.21	1.26
Competitive advantage	2.52	1.47
Required by government State and local government incentives	1.59	1.94
Profit opportunities	1.45	1.49
	1.36	1.17

Research Question Two

Five survey questions were designed to answer research question two: What are some of the encountered barriers for LEED registered projects to become certified? One of these questions was a Likert scale question with several barriers to rate. Three of the questions were open-ended questions concerning difficulties and barriers associated with the LEED certification process. One additional open-ended question asked the respondents to state suggestions for improving the LEED certification process.

The Likert scale question asked the respondents to rate a list of researcher-assumed barriers on a scale from 4 to 0 with 4 being "Most challenging" and 0 being "Not a challenge". It was found that the "Costs of documentation /other indirect costs", was ranked the highest, $M = 2.33$. Not far behind in rank were the barriers of "Team members lack of experience with LEED certification", $M = 2.17$, and the "Costs of green building practices or design", $M = 2.05$. Table 7 shows each of the barriers that were ranked and their average ranking.

Table 7

*Barriers to LEED Certification Ranked in Likert Scale**Question*

Barrier	Mean	Standard deviation
Cost of documentation/other		
indirect cost	2.33	1.18
Team members lack of		
experience w/ LEED cert.	2.17	1.24
Cost of green building		
practices or design	2.05	1.17
Direct cost of certification	1.88	1.15
Owner unable to recover up		
front cost	1.53	1.36
Communication/misunderstanding		
with the USGBC	1.49	1.38
Poor team		
communication/education	1.46	1.21
Unable to meet LEED		
prerequisites	1.19	1.09
Unable to qualify for enough		
credits	1.00	1.15
Project team turnover	0.79	1.08

The three open ended questions that asked specifically about barriers to certification ranged from general to more specific. The general question asked respondents to state "the most challenging difficulty or barrier encountered as part of the LEED certification process." Two main barriers were identified from the responses to this general question. The most frequent barrier mentioned (16 respondents) was the difficulty of the documentation process for LEED certification. The second most frequently mentioned barrier (13 respondents) was the cost associated with certification, including direct certification fees, and the costs of green building practices and/or design. The third and fourth most frequently mentioned barriers were lack of project team education concerning the certification process and lack of communication and/or misunderstanding with USGBC (7 and 6 respondents respectively). Table 8 shows the barriers mentioned in this open ended question and the frequency that they were mentioned.

Table 8

Barriers to Certification Mentioned in the Open Ended Question

Barriers	Frequency
Difficulty of LEED documentation	16
Cost associated with certification fees, green building practices, and/or design.	13
Lack of project team education	7
Difficult communication/misunderstanding with USGBC	6
Cost of Documentation	5
LEED not part of the planning phase, certification was an afterthought	3
Problems applying LEED requirements to unique projects. LEED does not fit all circumstances	3
Lack of project team buy inn.	2
Difficulties because of the newness of LEED certification.	2
Problem with availability of products	1
Did not respond	1

The other two open ended questions asked respondents to identify external ("outside of your company") and internal ("Within your company") barriers that made the certification process difficult. The external barrier that was mentioned the most (15 respondents) was a lack of awareness, education, or experience on the part of project personnel including contractors, owners, architects, engineers, subcontractors, and/or material suppliers. Two additional external barriers that were mentioned were the difficulty of documentation (9 respondents) and lack of commitment or buy-in from the project team (8 respondents). The internal barriers did not seem to be as much of an issue with 18 respondents choosing not to answer this question or stating "none" as the response. There were, however, a couple of internal barriers that were mentioned often enough to be noted. These barriers were cost (9 respondents), and education of company personnel/learning curve because these were some of the first LEED projects (8 respondents).

The open-ended question that asked respondents how the LEED certification process could be improved yielded one common suggestion. Sixteen respondents suggested that the USGBC improve the documentation process. Another suggestion

(8 respondents) was to improve communication between the USGBC and project team.

Research Question Three

Research question three was: What are some of the observed differences between registered buildings that receive certification and those that do not? To answer this question, the surveys were divided into two groups for analysis. These groups consisted of those projects that had achieved certification and those that were no longer planning to certify. The data showed that 20 of the 43 surveyed projects had achieved certification. These 20 cases became the 'certified' group (CG). The data also showed that some of the projects had not been completed and thus would not have had a chance to become certified. Of the 23 projects that had not achieved certification, 14 indicated that certification was still a goal and 8 indicated that it was not. These 8 projects that indicated that certification was not still a goal became the 'non-certified' group (NCG).

The analysis of the multiple choice and Likert scale questions allowed many variables to be compared by group. The first comparison was made concerning reasons for working toward certification. There were no differences apparent for any of the ranked reasons. The second

comparison was made concerning the ranked barriers to certification. The NCG ranked all but one of the barriers higher than the CG. The two that were ranked considerably higher were the barriers that the owner would be unable to recover up front costs and the direct cost of certification. The results of this comparison of ranked barriers can be seen in Table 9.

Several other variables were examined to determine differences between the groups with no sizeable difference found. These variables were: the square footage of the project, the end use of the project, the organization that initiated certification, the organization in charge of the documentation process, the number of organizations that had a LEED accredited professional working on the project, and the number of organizations that had worked on a previous LEED project.

The open-ended question compared by group, gave some additional insight into research question three. For the question concerning reasons that projects became certified, it was found that 45% of the respondents in the CG stated that certification was owner driven. No respondents in the NCG stated this as a reason.

Table 9

Ranked Barriers Compared by Groups

Barrier	CG Mean	NCG Mean	Mean Difference
Unable to meet LEED prerequisites	0.95	1.63	0.68
Unable to qualify for enough credits	0.7	1.75	1.05
Direct cost of certification	1.15	2.88	1.73
Costs of GB practices or design	1.7	2.88	1.18
Owner unable to recover up front costs	0.8	2.75	1.95
Costs of documentation/other indirect costs	1.9	2.63	0.73
Project team turnover	0.63	0.67	0.04
Team members lack of experience w/ LEED	2.35	2.14	-0.21
Poor team communication/education	1.3	1.86	0.56
Communication/misunderstanding with the USGBC	1.65	2.25	0.6

For the question that asked respondents to state "the most challenging difficulty or barrier encountered as part

of the LEED certification process", a higher percentage of the NCG mentioned costs associated with LEED requirements and green building practices as a barrier. For the question concerning external barriers, a higher percentage of the CG mentioned a lack of awareness, education, or experience as a barrier. No differences were found concerning internal barriers.

For the question concerning suggestions for improvement, a higher percentage of the NCG suggested a specific change to a LEED credit or the certification process. Additionally, a higher percentage of the CG suggested improving communication with the USGBC. No other significant differences were found concerning suggestions for improvement.

Discussion

Based upon the responses from the two survey questions concerning reasons for LEED certification, the idea of being good environmental stewards is an overriding theme. For both of these survey questions, environmental stewardship was the highest ranked and most mentioned reason for working toward LEED certification. The next highest ranked reason, "to keep green building a project priority", and the second most often mentioned reason, that

the owner required LEED certification, are certainly consistent with this theme. It seems reasonable to believe that the reasons of "owner required" and "to keep green building a project priority" may be linked. LEED certification may be required by the owner to keep green building a project priority. It may also be the case that the owner required LEED certification to keep green building a project priority because the owner desired to be a good environmental steward.

For the research question concerning barriers to LEED, there were several common barriers that tied the five survey questions together. One of these barriers was the idea that the documentation portion of the certification process was a problem. Some cited the cost associated with documentation as a problem. Others mentioned the difficulty of getting the needed documentation from project players, another mentioned the difficulty associated with the standard forms provided by the USGBC. At any rate the documentation process seemed to be an important barrier.

Another common barrier was the general lack of education concerning the LEED certification process. A suggestion was made that a contractor's guide to LEED be published. Another respondent suggested that several case studies be documented outlining the LEED certification

process for others to follow. It should be noted that because this research project collected information from early LEED projects, little education or previous experience would have been gained prior to these projects. This barrier may gradually be eliminated as more people become educated about and experienced with the certification process.

Three additional barriers identified were cost, communication, and project team buy-in/commitment. There are many costs associated with LEED certification. Some costs mentioned as barriers were: the cost of registration/certification fees paid to the USGBC, the costs of managing and employing green building practices, and the cost of document collection. The communication barrier involved the communication difficulties that respondents had with the USGBC. The barrier concerning the lack of project team buy-in/commitment revealed itself in active and passive resistance to green concepts. Many respondents also mentioned that it was often difficult to collect the required documents from the project team. This could potentially be interpreted as a lack of cooperation because of a lack of buy-in.

As mentioned earlier, one of the greatest barriers to LEED certification centers around the problems associated

with the documentation process. It was also mentioned earlier that 27 of the 43 respondents were responsible for LEED documentation and 14 participated in LEED documentation. It is possible that since many of the respondents were heavily involved in documentation, they rated documentation as a major barrier.

The group comparison yielded several interesting results. It is interesting to note that the NCG ranked all but one of the barriers given in the Likert scale question higher than the CG. It seems reasonable that project personnel would rate barriers higher if these barriers actually prevented them from achieving certification. It is also interesting that the two barriers that ranked the highest in comparison were both associated with cost. The open-ended question concerning barriers also yielded a higher percentage of NCG members mentioning cost associated with certification as a barrier. This seems to indicate that cost was a bigger issue for those projects that did not, certify and were not planning to.

Another interesting difference between the groups was the fact that 45% of the CG stated as a reason for certification that certification was owner-driven. None of the NCG mentioned this as a reason for certification, even though 75% of the NCG projects had owners that initiated

the idea to become LEED registered and certified. Seventy percent of the CG projects stated that the owner initiated the idea to become LEED registered and certified. From the open-ended questions, it was also found that the CG group in comparison seemed to be more interested in improving the education and communication pertaining to the certification process.

Further Research

During the process of this investigation, areas for further research became apparent. One of the most significant barriers found in this investigation was the problems associated with the documentation necessary for LEED certification. An in-depth study of the documentation process to determine areas of improvement would have great value.

Several respondents gave suggestions for improving the documentation process. One suggestion was the development of a contractor's guide to LEED. A practical guide to understanding the process and the documentation necessary for certification would be a helpful tool for all involved. Another suggestion was made that several detailed case studies focusing on projects that became certified would be useful. These case studies could follow and document the whole LEED certification process. It would be important

for these case studies to include suggestions for improvement and identify areas that seemed to be more difficult than others. These suggested studies may also work to minimize the often-mentioned barrier of lack of education concerning LEED certification

Another barrier that seemed to be significant was the costs associated with both LEED certification fees and the employment of green building practices. An in-depth study to investigate the costs associated with LEED certified projects would be very useful. One study might look at the different LEED categories in which points are earned to determine which of these categories are the most expensive or gave the least benefit for the highest cost (cost-to-benefit ratio). Life-cycle cost should be a factor in determining the cost and benefit for this study. A follow-up study might investigate those categories that are determined to have the highest cost-to-benefit ratio and determine how improvements could be made in those categories.

Duplicate studies could be done to investigate projects registered later than the projects included in this study. These duplicate studies could be done on a yearly basis. The findings from the duplicate studies could be compared to the finding of this study to determine

if changes in reasons for and barriers to certification are found.

Another area of interest that could be investigated concerns the finding that many of the CG, and none of the NCG stated that certification was "owner driven" (stated in the open ended question concerning reasons for certification). It is interesting to note that 75% of the NCG and only 70% of the CG indicated that the owner initiated the idea to become certified (in multiple choice question). It may be that some owners have a contract requirement that LEED certification will be achieved. Other variables could be investigated to explain this finding.

Conclusion

This exploratory research produced several interesting results concerning each of the three research questions. The most compelling reasons for working toward LEED certification were:

- environmental stewardship,
- to keep green building a project priority, and
- owner required/driven.

The most significant barriers to LEED certification were:

- problems with LEED documentation,

- a lack of education or experience with or about LEED certification,
- costs associated with LEED certification and green building,
- communication barriers with the USGBC, and
- a lack of team buy-in.

The major differences between the certified projects and those that no longer have certification as a goal were found in the fact that the NCG ranked all of the barriers higher than the CG. The barriers ranked significantly higher by the NCG were those associated with costs. Additionally, many of the CG stated "owner driven" as a reason for certification and none of the NCG stated this as a reason (stated in the open-ended question).

References

- Barnett, D. L., & Browning, W. D. (1995). *A Primer on Sustainable Building*. Snowmass CO: Rocky Mountain Institute.
- Lovins, A. B., & Browning, W. D. (1992). Negawatts for Buildings. *Urban Land*.
- Rocky Mountain Institute.. *Green Development: Why Build Green*. Retrieved November 2, 2002, from <http://www.rmi.org/sitepages/pid174.php>

- Rogers, E. M. (1995). *Diffusion of Innovations* (Fourth ed.)
New York NY: The Free Press.
- Romm, J. J., & Browning, W. D. (1994, December). *Greening the building and the bottom line: increasing productivity through energy efficient design*. Retrieved October 24, 2002, from <http://www.rmi.org/sitepages/pidl74.php>
- Roodman, D. M., & Lenssen, N. (1995). *A Building Revolution: how ecology and health concerns are transforming construction, worldwatch paper 124* [Brochure]. Washington D.C.: Worldwatch Institute.
- U. S. Environmental Protection Agency. (1998). *Characterization for Building-Related Construction and Demolition Debris in the United States* (EPA No. 530R98010).
- U.S. Department of Energy, Energy Information Administration.. *March 2001 Monthly Energy Review* [Brochure].
- U.S. Green Building Council.. *LEED certification process*. Retrieved March, 2004, from <https://www.usgbc.org/LEED/Project/certprocess.asp>
- U.S. Green Building Council. *Meet the USGBC*. Retrieved November, 2002, from http://www.usgbc.org/AboutUs/mission_facts.asp
- U.S. Green Building Council. *Who Are we*. Retrieved November, 2002, from <http://www.usgbc.org/AboutUs/whoweare.asp>

- U.S. Green Building Council. *Certification Process*. Retrieved February, 2004, from <https://www.usgbc.org/LEED/Project/certprocess.asp>
- U.S. Green Building Council. *Industry Statistics*. Retrieved November, 2004, from http://www.usgbc.org/Resources/industry_statistics.asp
- US Green Building Council. (2000). *LEED Reference Guide Version 2.0*. Washington D.C.: U. S. Green Building Council.
- Whole Building Design Guide Sustainable Committee.. *Whole Building Design Guide*. Retrieved November 15, 2002, from <http://www.wbdg.org/design/index.php?cn=2.8&cx=0>
- Wilson, A., Uncapher, J. L., McManigal, L., Lovins, H. L., Cureton, M., & Browning, W. D. (1998). *Green Development: Integrating Ecology and Real Estate*. New York NY: John Wiley & Sons, Inc.

APPENDIX A

Cover Letter and Survey

Cover Letter
Sent on department letterhead

Date: Date sent out

To: LEED registered project contact person

Re: An invitation to participate in research on the barriers to and reasons for LEED certification.

Dear LEED project contact person:

I am a master's student in the department of construction management at Colorado State University. I am interested in green building and believe that LEED certification is an important standard for the green building movement.

The title of my study is "Barriers to Certification for LEED Registered Projects". I am asking for your assistance in this study to identify some of the barriers that exist in the LEED certification process.

The survey is being conducted via a secure website and will take approximately 10 to 15 minutes to complete. Your participation in this research would be greatly appreciated but is voluntary. Your confidentiality and anonymity are ensured. Your identifiable information contained in the survey will only be used during the data collection phase of this study. If a survey is less than half completed you may be contacted to verify that it was your intention not to complete the survey, otherwise you will not be contacted. During the analysis portion of the study, you will not be individually identified with your questionnaire or response. All collected data will be aggregated and grouped.

There are no known risks associated with participation in this study. Your responses to the survey may contribute to the improvement of the LEED certification process. The knowledge gained from your responses may also help those individuals who will work on LEED projects in the future. By completing the survey you are agreeing to participate in the study. If you have any questions or comments concerning this study feel free to contact us using the information provided. Questions about participants' rights may be directed to the Colorado State University Regulatory Compliance Office at (970) 491-1563.

Thank you for your interest and participation in this research. The results of this study will be available upon request.

To participate in the survey please click on the following link: [link to survey]

Brad Johnson
Graduate Student
(970) 491-2174
bradlyt@colostate.edu

Advisor:
Dr. James Folkestad
(970) 491-7823
Folkestad@CAHS.Colostate.edu

To be removed from this mailing list, please click the following link:
[Remove Link]

1. Name of Project _____
2. Project completion date (if completed)/mm/dd/yy _____
3. Your name_____
4. Work phone _____
5. In which type of organization do you work?
 - a. Owner
 - b. Architect
 - c. General Contractor
 - d. Engineer
 - e. Construction Manager
 - f. Green Building Consultant
 - g. Other (please specify)_____
6. Occupation and Title_____
7. Your responsibility concerning LEED certification for this registered project?
 - a. Responsible for LEED documentation
 - b. Participated in LEED documentation
 - c. Not involved in LEED documentation
8. Has this LEED registered project achieved LEED certification?
 - a. Yes
 - b. No
9. If yes to question 8, please give the project Certification date mm/dd/yy _____
10. If No to question 8, is certification still a goal for this project?
 - a. Yes
 - b. No
11. What is the square footage of the project?
 - a. Less than 75,000 square feet
 - b. 75,000 to 300,000 square feet
 - c. More than 300,000 square feet

12. What is the end use for this project
- a. Education
 - b. Retail
 - c. Office space
 - d. Manufacturing
 - e. Other (please specify)_____
13. In what country is the project located?
Country _____
14. Please specify the state if located in the U.S.
State_____
15. Which organization initiated the idea to become LEED registered and certified?
- a. Owner
 - b. Architect
 - c. General Contractor
 - d. Engineer
 - e. Construction Manager
 - f. Consultant
 - g. Other (please specify)_____
16. Which organization was/is in charge of documentation for LEED certification for this project?
- a. Owner
 - b. Architect
 - c. General Contractor
 - d. Engineer
 - e. Construction Manager
 - f. Consultant
 - g. Other (please specify)_____
17. Are you a LEED accredited professional?
- a. Yes
 - b. No
18. Which of the following organizations had a LEED accredited professional working on this project? (may select more than one)
- a. Owner
 - b. Architect
 - c. General Contractor
 - d. Engineer
 - e. Construction Manager
 - f. Consultant

g. Other (please specify) _____

19. Select from the following list all who worked on this project that have worked on a LEED project prior to their involvement with the LEED registered project in question.

- a. Owner
- b. Architect
- c. General Contractor
- d. Engineer
- e. Construction Manager
- f. Consultant
- g. Other (please specify) _____

20. What was the most compelling reason for working toward LEED Certification for this project?

21. What was the most challenging difficulty or barrier encountered as part of the LEED certification process? _____

22. Rate the importance of each reason for working toward LEED certification.

1=Most influential 2=Very influential
3=Some influence 4=Little influence 5=NA

- Required by government
- Validate achievement through third party review
- State and local government incentives
- To keep green building a project priority
- Competitive advantage
- Profit opportunities
- Environmental stewardship
- Other (please specify) _____

23. Rate the following difficulties or barriers encountered as part of the LEED certification process.

1=Most challenging 2=Very challenging
3=Somewhat challenging 4=A little challenging
5=Not a challenge

- LEED documentation
- Communication/misunderstanding with the USGBC
- Unable to meet LEED certification prerequisites
- Unable to qualify for enough credits for LEED certification
- Finances (Fees or direct cost of certification)
- Finances (Cost of green building practices or design)
- Finances (Owner unable to recover up front costs through life cycle savings, due to sale of project)
- Project team turnover
- Lack of team cooperation
- Other (please specify)_____

24. From your experience, what suggestions do you have for improving the LEED certification process?_____

25. What external barriers (outside of your company)made the certification process difficult?

26. What internal barriers (within your company)made the certification process difficult?

APPENDIX B

Raw Data

Respondent Number	Name of Project	Project completion date (if completed)	Your name	Work Phone	In which type of organization do you work?	
	Open-Ended Response	03/best guess/2000	Open-Ended Response	Open-Ended Response	Response	Open-Ended Response
1	XXXX	10/10/2005	XXXX	XXXX	Architect	
2	XXXX	10/1/2002	XXXX	XXXX	Other (please specify)	Engineering Consultant
3	XXXX	2/1/2002	XXXX	XXXX	Green Building Consultant	
4	XXXX	9/26/2003	XXXX	XXXX	Owner	
5	XXXX		XXXX	XXXX	Architect	
6	XXXX	1/1/2006	XXXX	XXXX	Architect	
7	XXXX	8/1/2004	XXXX	XXXX	Architect	
8	XXXX	11/30/2001	XXXX	XXXX	Owner	
9	XXXX	2/15/2003	XXXX	XXXX	General Contractor	
10	XXXX	1/1/2006	XXXX	XXXX	Architect	
11	XXXX	2/14/2005	XXXX	XXXX	Architect	
12	XXXX	4/1/2003	XXXX	XXXX	Green Building Consultant	
13	XXXX		XXXX	XXXX	Green Building Consultant	
14	XXXX	8/30/2002	XXXX	XXXX	Owner	
15	XXXX		XXXX	XXXX	Other (please specify)	U.S. General Services Administration
16	XXXX	7/30/2004	XXXX	XXXX	Architect	
17	XXXX	6/30/2004	XXXX	XXXX	Architect	
18	XXXX	8/15/2003	XXXX	XXXX	Green Building Consultant	
19	XXXX	5/1/2003	XXXX	XXXX	Architect	
20	XXXX	6/1/2000	XXXX	XXXX	Owner	
21	XXXX	9/1/2002	XXXX	XXXX	Owner	
22	XXXX	5/30/2003	XXXX	XXXX	Owner	
23	XXXX	4/1/2002	XXXX	XXXX	Engineer	

24	XXXX	8/31/2004	XXXX	XXXX	Owner	
25	XXXX	6/30/2006	XXXX	XXXX	Architect	
26	XXXX	9/3/2003	XXXX	XXXX	Architect	
27	XXXX	6/15/2004	XXXX	XXXX	Other (please specify)	Municipal utility
28	XXXX	8/15/2002	XXXX	XXXX	Architect	
29	XXXX	5/15/2003	XXXX	XXXX	Architect	
30	XXXX	10/30/2001	XXXX	XXXX	Architect	
31	XXXX	8/30/2005	XXXX	XXXX	Owner	
32	XXXX	9/1/2001	XXXX	XXXX	Architect	
33	XXXX	10/1/2003	XXXX	XXXX	Architect	
34	XXXX	12/16/2002	XXXX	XXXX	Owner	
35	XXXX	8/13/2003	XXXX	XXXX	Other (please specify)	Government Project Manager for Planning, Design & Construction Phases
36	XXXX	11/1/2004	XXXX	XXXX	Architect	
37	XXXX	6/30/2000	XXXX	XXXX	Architect	
38	XXXX	6/30/2006	XXXX	XXXX	Green Building Consultant	
39	XXXX	12/1/2004	XXXX	XXXX	Architect	
40	XXXX	5/6/2002	XXXX	XXXX	Green Building Consultant	
41	XXXX	8/1/2003	XXXX	XXXX	Architect	
42	XXXX	11/1/2003	XXXX	XXXX	Other (please specify)	Government
43	XXXX	5/31/2005	XXXX	XXXX	Other (please specify)	A/E firm

Respondent Number	Occupation and title	Your responsibility concerning LEED documentation for this registered project?	Project achieved LEED certification?	Project certification date (if certified)
	Open-Ended Response	Response	Response	05/best guess/2001
1	XXXX	Participated in LEED documentation	No	
2	XXXX	Responsible for LEED documentation	Yes	4/11/2003

3	XXXX	Responsible for LEED documentation	Yes	12/15/2002
4	XXXX	Participated in LEED documentation	Yes	1/20/2004
5	XXXX	Responsible for LEED documentation	No	
6	XXXX	Not involved in LEED documentation	No	
7	XXXX	Participated in LEED documentation	No	
8	XXXX	Participated in LEED documentation	Yes	10/30/2002
9	XXXX	Responsible for LEED documentation	Yes	6/15/2003
10	XXXX	Responsible for LEED documentation	No	6/1/2006
11	XXXX	Responsible for LEED documentation	No	5/1/2005
12	XXXX	Responsible for LEED documentation	Yes	4/1/2003
13	XXXX	Responsible for LEED documentation	No	
14	XXXX	Participated in LEED documentation	Yes	4/15/2004
15	XXXX	Participated in LEED documentation	No	
16	XXXX	Responsible for LEED documentation	No	
17	XXXX	Responsible for LEED documentation	No	
18	XXXX	Responsible for LEED documentation	No	
19	XXXX	Responsible for LEED documentation	Yes	1/15/2004
20	XXXX	Participated in LEED documentation	No	
21	XXXX	Responsible for LEED documentation	Yes	7/1/2003
22	XXXX	Participated in LEED documentation	Yes	1/21/2004
23	XXXX	Responsible for LEED documentation	Yes	6/4/2004
24	XXXX	Participated in LEED documentation	No	
25	XXXX	Responsible for LEED documentation	No	
26	XXXX	Responsible for LEED documentation	Yes	9/3/2003

27	XXXX	Participated in LEED documentation	Yes	12/15/2004
28	XXXX	Responsible for LEED documentation	Yes	10/1/2002
29	XXXX	Responsible for LEED documentation	Yes	1/28/2005
30	XXXX	Responsible for LEED documentation	No	
31	XXXX	Not involved in LEED documentation	No	
32	XXXX	Responsible for LEED documentation	Yes	9/1/2002
33	XXXX	Responsible for LEED documentation	Yes	11/1/2004
34	XXXX	Responsible for LEED documentation	No	
35	XXXX	Responsible for LEED documentation	Yes	12/18/2003
36	XXXX	Participated in LEED documentation	No	
37	XXXX	Responsible for LEED documentation	Yes	10/30/2002
38	XXXX	Responsible for LEED documentation	No	
39	XXXX	Participated in LEED documentation	No	
40	XXXX	Participated in LEED documentation	Yes	9/20/2002
41	XXXX	Participated in LEED documentation	No	
42	XXXX	Responsible for LEED documentation	No	
43	XXXX	Responsible for LEED documentation	No	

Respondent Number	Is certification still a goal for this project?	What is the square footage of the project?
	Response	Response
1	Yes	More than 300,000 square feet
2		Less than 75,000 square feet
3		75,000 to 300,000 square feet
4		Less than 75,000 square feet
5	No	Less than 75,000 square feet
6	Yes	75,000 to 300,000 square feet
7	Yes	75,000 to 300,000 square feet
8		Less than 75,000 square feet
9		Less than 75,000 square feet

10	Yes	Less than 75,000 square feet
11	Yes	75,000 to 300,000 square feet
12		More than 300,000 square feet
13	No	Less than 75,000 square feet
14		Less than 75,000 square feet
15	Yes	75,000 to 300,000 square feet
16		75,000 to 300,000 square feet
17	Yes	75,000 to 300,000 square feet
18	Yes	75,000 to 300,000 square feet
19		Less than 75,000 square feet
20	No	Less than 75,000 square feet
21		Less than 75,000 square feet
22		75,000 to 300,000 square feet
23		Less than 75,000 square feet
24	No	75,000 to 300,000 square feet
25	Yes	Less than 75,000 square feet
26		Less than 75,000 square feet
27		Less than 75,000 square feet
28		75,000 to 300,000 square feet
29		75,000 to 300,000 square feet
30	No	Less than 75,000 square feet
31	Yes	Less than 75,000 square feet
32		Less than 75,000 square feet
33		Less than 75,000 square feet
34	No	75,000 to 300,000 square feet
35		Less than 75,000 square feet
36	No	75,000 to 300,000 square feet
37		Less than 75,000 square feet
38	Yes	75,000 to 300,000 square feet
39	Yes	Less than 75,000 square feet
40		Less than 75,000 square feet
41	No	75,000 to 300,000 square feet
42	Yes	Less than 75,000 square feet
43	Yes	Less than 75,000 square feet

Respondent Number	What is the end use for this project? (may choose more than one)					
	Education	Retail	Office space	Manufacturing	Other (please specify)	Open-Ended Response
1		Retail				
2					Other (please specify)	Laboratory
3			Office space			
4	Education		Office space			

5					Other (please specify)	Nature Center
6					Other (please specify)	hospital
7					Other (please specify)	transportation
8			Office space			
9			Office space			
10	Education					
11	Education					
12			Office space			
13		Retail				
14					Other (please specify)	Public assembly
15					Other (please specify)	Federal Courthouse
16	Education					
17					Other (please specify)	Hotel
18	Education					
19	Education					
20					Other (please specify)	Assisted Living
21	Education					
22					Other (please specify)	Residential (Apartments)
23			Office space			
24					Other (please specify)	Medical and Office
25	Education					
26	Education				Other (please specify)	Community Center
27					Other (please specify)	affordable housing
28	Education					
29			Office space			

30				Manufacturing		
31					Other (please specify)	Government - Border Station
32	Education					
33					Other (please specify)	Medical - Clinic Building
34					Other (please specify)	LIBRARY
35	Education				Other (please specify)	To provide Public xxxxxx xxxxxxxxs for xxxxxxxx Events
36		Retail	Office space			
37	Education					
38					Other (please specify)	xxxxxxxxxxxxxxxxx, xxxxxxxxxxxxxxxx and education
39			Office space			
40			Office space			
41	Education					
42					Other (please specify)	Industrial operations center
43			Office space			

Respondent Number	In what country is the project located?	State if located in the U.S.	Which organization initiated the idea to become LEED registered and certified?		Which organization was/is in charge of documentation for LEED certification for this project?	
	Country -	State -	Response	Open-Ended Response	Response	Open-Ended Response
1	United States	CA	Architect		Architect	
2	United States	MA	Owner		Consultant	
3	United States	TX	Owner		Consultant	
4	United States	CA	Owner		Consultant	

5	United States	NV	Architect		Other (please specify)	A/E and GC
6	United States	MO	Architect		Architect	
7	United States	MN	Owner		Architect	
8	United States	WA	Owner		Other (please specify)	Owner's Representative
9	United States	KS	Owner		General Contractor	
10	United States	WA	Architect		Architect	
11	United States	MI	Architect		Architect	
12	United States	CA	Owner		Consultant	
13	United States	OR	Owner		Consultant	
14	United States	WA	Other (please specify)	City Council	Architect	
15	United States	AS	Other (please specify)	Government agency	Consultant	
16	United States	OR	Architect		Architect	
17	United States	MD	Architect		Architect	
18	United States	PA	Consultant		Consultant	
19	United States	PA	Owner		Architect	
20	United States	NJ	Owner		Consultant	
21	United States	SC	Owner		Other (please specify)	Owner collected documentation/consultant prepared submittal
22	United States	MD	Owner		Consultant	
23	United States	WI	Owner		Owner	
24	United States	OK	Owner		Architect	
25	United States	AL	Owner		Consultant	

26	United States	VA	Owner		Architect	
27	United States	WA	Architect		Architect	
28	United States	NC	Architect		Architect	
29	United States	MD	Architect		Architect	
30	United States	OH	Owner		Architect	
31	United States	MI	Owner		Other (please specify)	Not pursued because of high unanticipated costs
32	United States	MI	Architect		Architect	
33	United States	NY	Architect		Architect	
34	United States	OR	Owner		Architect	
35	United States	AK	Other (please specify)	National Weather Service Headquarters	Other (please specify)	AE under contract to the Government
36	United States	WA	Owner		General Contractor	
37	United States	AZ	Owner		Architect	
38	United States	CA	Owner		Consultant	
39	United States	FL	Architect		Other (please specify)	Commissioning agent
40	United States	CA	Consultant		Consultant	
41	United States	NY	Architect		Architect	
42	United States	OR	Owner		Owner	
43	United States	DC	Architect		Architect	

Respondent Number	Respondent a LEED AP?	Which of the following organizations had a LEED accredited professional working on this project? (may select more than one)							Open-Ended Response
		Owner	Architect	General Contractor	Engineer	Construction Manager	Consultant	Other (please specify)	
1	Yes		X	X	X				
2	Yes					X			
3	No		X						
4	Yes	X	X	X	X		X		
5	Yes		X						
6	No				X	X			
7	Yes		X		X				
8	No						X		
9	Yes		X	X					
10	Yes		X	X	X		X		
11	Yes		X			X			
12	Yes	X	X				X		
13	Yes						X		
14	No		X						
15	No		X				X		
16	Yes		X	X	X				
17	Yes		X	X	X	X	X		
18	Yes		X				X		
19	Yes				X				
20	No						X		
21	Yes	X		X					
22	Yes						X		
23	Yes	X	X		X				
24	No		X						
25	Yes	X			X		X		
26	Yes		X	X		X	X		
27	Yes		X	X			X		
28	Yes		X						
29	Yes		X	X				X	Lighting Designer
30	Yes		X						
31	No		X				X		
32	Yes		X						
33	Yes		X						
34	No		X						
35	No		X						
36	No		X	X			X		
37	Yes		X						
38	Yes	X					X		

39	Yes		X					X	commissioning agent
40	Yes						X		
41	Yes		X						
42	No		X						
43	Yes		X	X	X				

Respondent Number	Select from the following list all who had worked on a LEED project prior to this project.							Open-Ended Response
	Owner	Architect	General Contractor	Engineer	Construction Manager	Consultant	Other (please specify)	
1								
2							X	none- Pilot Project
3							X	No One
4				X		X		
5								
6		X		X	X			
7		X	X	X	X			
8								
9								
10		X		X				
11								
12		X				X		
13							X	none
14								
15	X	X				X		
16		X	X	X				
17		X	X	X				
18						X		
19								
20						X		
21							X	NONE 23rd building registered
22						X		
23	X	X		X				
24								
25				X		X		
26						X		
27								
28								

29								
30								
31	X	X	X	X	X			
32								
33								
34	X	X						
35							X	none had worked previously - all were first timers
36		X	X			X		
37								
38	X		X	X		X		
39								
40						X		
41							X	none
42		X				X		
43		X		X				

Respondent Number	Rate the importance of each reason for working toward LEED certification.								Other specified
	Required by government	Validate achievement through third party review	State and local government incentives	To keep green building a project priority	Competitive advantage	Profit opportunities	Environmental stewardship	Other	
1	VI	SI	VI	SI	SI	SI	LI		
2	MI	VI	N/A	VI	N/A	N/A	VI		
3	SI	VI	SI	N/A	N/A	N/A	MI		
4	NI	VI	LI	MI	VI	N/A	MI	N/A	
5	N/A	SI	N/A	VI	LI	NI	MI	MI	Sustainable Future
6	MI	SI	NI	VI	VI	NI	VI		
7	MI	VI	NI	SI	NI	NI	MI		
8	N/A	N/A	N/A	MI	NI	NI	MI		
9	NI	NI	NI	NI	NI	NI	SI		
10	NI	LI	NI	VI	VI	N/A	MI		
11	N/A	VI	N/A	MI	VI	SI	MI		
12	N/A	MI	N/A	MI	VI	SI	MI		

13		MI	VI	VI	SI	LI	VI	VI	increase awareness and capacity within the building industry
14	MI	SI	SI	VI	LI	LI	VI		
15	MI	VI	LI	SI	VI	VI	VI		Increased comfort, health and productivity of building occupants
16	VI	VI	VI	VI	SI	LI	SI		
17	LI	NI	SI	SI	SI	NI	VI		
18	NI	VI	VI	SI	LI	NI	VI		
19	N/A	SI	N/A	MI	VI	N/A	MI		
20	N/A	MI	N/A	VI	VI	N/A	VI		
21	N/A	VI	N/A	MI	VI	N/A	MI		
22	LI	MI	NI	SI	LI	LI	VI		
23	N/A	LI	N/A	NI	NI	NI	MI		
24	NI	LI	NI	SI	SI	NI	VI	VI	Demonstrate care for occupants
25	N/A	LI	N/A	MI	LI	NI	MI		
26	MI	NI	NI	MI	LI	NI	MI		
27	N/A	VI	VI	VI	LI	NI	VI		
28	N/A	VI	N/A	MI	MI	LI	VI	N/A	
29	LI	SI	LI	VI	VI	SI	VI		
30	N/A	NI	NI	VI	NI	NI	VI		
31	MI	VI	LI	MI	SI	NI	MI		
32	NI	SI	NI	MI	N/A	N/A	MI		
33	N/A	SI	VI	MI	N/A	N/A	MI		
34		VI					VI		
35	VI	VI	NI	MI	SI	NI	MI	VI	Our Project Team adopted the 'goal' of achieving LEED Certification and we kept encouraging one another during the whole process.
36	N/A	NI	N/A	MI	SI	LI	MI		
37	N/A	VI	N/A	MI	VI	VI	MI		
38	MI	SI	SI	SI	NI	NI	VI		
39	N/A	MI	N/A	VI	MI	LI	MI		
40	N/A	SI	NI	VI	LI	LI	MI		
41	NI	VI	LI	SI	VI	VI	SI		
42	N/A	SI	N/A	VI	N/A	N/A	MI		
43	MI	SI	VI	SI	LI	NI	NI		

Respondent Number	Rate the following difficulties or barriers encountered as part of the LEED certification process.
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	Unable to meet LEED certification prerequisites	Unable to qualify for enough credits for LEED certification	Finances (Fees or direct cost of certification)	Finances (Cost of green building practices or design)	Finances (Owner unable to recover up front costs)	Finances (Cost of documentation/other indirect costs)	through life cycle savings, due to sale of project)
1	ALC	ALC	SWC	NAC	NAC	ALC	
2	ALC	SWC	SWC	SWC	NAC	VC	NAC
3	VC	VC	ALC	ALC	ALC	SWC	NAC
4	NAC	NAC	ALC	MC	NAC	VC	
5	NAC	NAC	VC	ALC	VC	MC	NAC
6	SWC	SWC	VC	SWC	VC	VC	MC
7	SWC	ALC	VC	ALC	ALC	MC	NAC
8	ALC	NAC	ALC	SWC	NAC	NAC	NAC
9	SWC	NAC	ALC	VC	NAC	SWC	NAC
10	NAC	NAC	ALC	MC	SWC	ALC	NAC
11	SWC	SWC	VC	SWC	VC	VC	VC
12	NAC	NAC	ALC	SWC	ALC	SWC	ALC
13	VC	ALC	VC	MC	MC	MC	
14	SWC	SWC	VC	VC	SWC	MC	NAC
15	VC	VC	MC	MC	VC	MC	ALC
16	ALC	NAC	ALC	SWC		SWC	NAC
17	NAC	NAC	SWC	VC	MC	VC	NAC
18	NAC	NAC	SWC	ALC	ALC	ALC	ALC
19	ALC	SWC	SWC	SWC	VC	VC	NAC
20	SWC	SWC	ALC	MC	ALC	VC	ALC
21	NAC	NAC	ALC	NAC	SWC	SWC	ALC
22	SWC	ALC	NAC	ALC	SWC	NAC	SWC
23	NAC	ALC	ALC	NAC	NAC	SWC	NAC
24	SWC	SWC	VC	VC	MC	VC	NAC
25	NAC	ALC	SWC	VC	VC	MC	
26	NAC	NAC	ALC	ALC	NAC	SWC	NAC
27	SWC	NAC	ALC	SWC	NAC	ALC	NAC
28	SWC	NAC	ALC	VC	NAC	ALC	NAC
29	NAC	NAC	ALC	ALC	ALC	SWC	NAC
30	ALC	ALC	MC	SWC	ALC	ALC	
31	SWC	SWC	MC	SWC	SWC	MC	NAC
32	NAC	NAC	ALC	ALC	ALC	ALC	NAC
33	SWC	NAC	ALC	ALC	SWC	VC	ALC
34	MC	MC	VC	VC	VC	VC	
35	ALC	NAC	ALC	SWC	ALC	SWC	NAC
36	ALC	ALC	MC	MC	MC	ALC	NAC
37	NAC	VC	SWC	SWC	NAC	VC	NAC
38							
39	SWC	NAC	MC	ALC	ALC	VC	NAC

40	NAC	NAC	NAC	ALC	NAC	NAC	
41	NAC	VC	SWC	SWC	SWC	SWC	SWC
42	SWC	SWC	ALC	VC		VC	NAC
43	ALC	NAC	ALC	ALC	NAC	VC	ALC

Respondent Number	Rate the following difficulties or barriers encountered as part of the LEED certification process.					Other specified	
	Project team turnover	Team members' lack of experience with LEED certification requirements	Poor team communication/education	Communication/misunderstanding with the USGBC	Other (please specify in question 25)		Open-Ended Response
1	ALC	SWC	NAC				
2	NAC	MC	NAC	VC			
3	ALC	VC	VC	VC			
4	SWC	VC	SWC	SWC		Code & regulatory barriers to innovative green practices.	
5	NAC	NAC	ALC	VC			
6	ALC	ALC	ALC	ALC			
7	SWC	MC	MC	MC			
8	NAC	NAC	NAC	NAC			
9	NAC	VC	ALC	SWC			
10	NAC	ALC	NAC	ALC	NAC		
11	NAC	SWC	SWC	NAC			
12	NAC	SWC	NAC	SWC			
13	NAC	SWC	SWC	VC	MC	Building industry experience and capacity for green building requirements	
14	NAC	VC	ALC	MC			
15	ALC	VC	SWC	MC	MC	Need more flexibility in LEED to accommodate the real world situations encountered- for example a remote border station may not be able to get construction materials from within a 500 mile radius	
16	NAC	ALC	SWC	NAC			
17	SWC	SWC	SWC	NAC			
18	SWC	VC	ALC	NAC			
19	ALC	VC	ALC	SWC	MC	Effort required for documentation	

20	VC	MC	MC	NAC		
21	NAC	VC	NAC	ALC	VC	Project started before USGBC support materials available
22	ALC	SWC	ALC	SWC		
23	SWC	SWC	ALC	ALC	NAC	
24	NAC	ALC	NAC	ALC	VC	architectual heal-dragging
25	MC	VC	SWC	NAC	MC	Project has been severely hanicapped by financing of both hard and soft project costs. The same difficultly would have been encountered even if project was not seeking LEED certification.
26	NAC	NAC	SWC	NAC		
27	NAC	SWC	ALC	NAC		
28	NAC	SWC	SWC	NAC	NAC	
29	SWC	VC	ALC	SWC		
30	ALC	VC	ALC	VC	MC	Since the certification process started after the project was complete the commisioning requirement was missing. The USGBC said the owner could act as the commisioning agent but did not accept the pac
31	NAC	ALC	NAC	NAC	VC	With this particular building type (xxxx xxxxxx), it was difficult to quantify credit activities
32	VC	VC	VC	ALC		
33	NAC	NAC	ALC	SWC		
34				MC		
35	NAC	ALC	NAC	SWC	SWC	Lesson Learned - Finding out there are different 'Certified' Products on the market, NOT ALL are US Green Building Council certified.
36	NAC	ALC	ALC	ALC		
37		MC	VC	VC		
38						
39	SWC	SWC	VC	NAC	MC	lack of buy in from the contractor
40	NAC	MC	VC	ALC		
41		MC	MC	VC		
42	NAC	SWC	NAC	NAC		
43	NAC	NAC	SWC	NAC		

Respondent Number	From your experience, what suggestions do you have for improving the LEED certification process?
	Open-Ended Response
1	
2	Make it less documentation intensive. Rely more on the authority of the Design Team rather than LEED reviewers.
3	Start at the conceptual stages -- have the team make the commitment
4	Simplify documentation requirements.
5	Simplify the paperwork for the A/E/C team
6	na
7	Better communication and support by USGBC
8	A better understanding of the construction industry as a whole and the cost impacts on materials.
9	Sustainable Site credits are very limited if the project is a new building on a an undeveloped site.
10	Learn from precedent projects, and change to improve.
11	Forms for credits MR 4 & 5 need to have a lot more space to input information. USGBC needs to develop a contractor's guide to LEED. We found it very difficult trying to explain this to them. Working with all the low bidders on a public project made this even harder. Perhaps USGBC should work with the trade unions and institutes to better educate their members on the what and how of LEED.
12	The credits must be predictable and repeatable. Precedent is very important to allow future project teams to know what to expect.
13	Commissioning (especially small buildings) does not have much depth within the building industry. How do you create capacity for commissioning and monitoring with the small HVAC contractor that may be typically working on a 5-10,000 sf buildings? The requirements of LEED tends to be engineering intensive. It's great to require a DOE2 type modeling and or ASHRAE 90.1 analysis of the buildings, but is difficult to justify the cost to a building owner when these resources are not yet typically available readily available. USGBC should consider holding workshops for just commissioning a typical small building (perhaps even on-site) or help provide capacity for doe2 type modeling outside of just the engineering firms. I believe if I were to call 10 HVAC or control contractors (who typically do design/build on small commercial buildings) about their ability to do an ASHRAE 90.1 commissioning or DOE2 type analysis as part of their services, I would bet less than 20% would even know what I was talking about, let alone be able to provide it. Isolating those type of functions to just engineering firms does not increase capacity or seems very sustainable. I have worked on 3 projects where the owner has decided during construction not to proceed further with LEED certification.
14	
15	Tailor it more to the specific project under development and its circumstances. Help folks that are trying to build green get to green. Possibly create a 'recognized category' for those who strive for LEED certification but can't quite get there. Do a joint accord with EPA on the Energy Star Building standards as part of LEED certification. USGBC should recognize and grant credit for Energy Star status.

16	Templates should allow spreadsheets to expand with amount of data provided. Formulas in spreadsheets should be transparent but not modifiable.
17	provide opportunities for progress review, beyond the CI written format. ex: meet with USGBC to discuss strategies.
18	
19	None
20	Hire and experienced inspired architect and builder. Write it into the contract in clear direct language - that they understand the documentation required and will provide it all.
21	Several peices fo documentation were missed by USGBC reviewer during first submittal. Better training for review team.
22	More common sense from the reviewers. There were basic concepts that were misunderstood and it was very hard to communicate via the appeal process.
23	
24	Return it to a true self-certification process. Come up with a better plan for buildings that are partially occupied at completion/time for certification.
25	
26	dont audit so many letter templates
27	Of late with many contractors providing documentation review, quality of review is inconsistent from project to project
28	USGBC needs to continue to clarify and refine the documentation requirements so that designers and contractors know exactly what will be expected in the certification review
29	Provide more examples and guidance, which USGBC has already started to do.
30	When we start the HTM project there were very few LEED projects certified. So we had a huge learning curve and the owner was not interested in LEED certification when the project started, Only after we were completed.
31	Documented case studies, especially of costs involved would be helpful - perhaps developing a 'desk guide' covering a wide variety of building types, geographic locations/project environments would be helpful. Wide publicity of these efforts would also help.
32	Require documentation from contractors prior to commencing work. Maintain project team integrity/ consistency. Allow for extended design and construction time. Provide seperate contract and budget within company for LEED Documentation.
33	
34	
35	Develop some method/way to permit LEED applicants to have better confidence that their selected LEED point areas WILL QUALIFY in the final LEED evaluation process.....my project example: Providing Lumber for the Project that was originally harvested from a professionally managed 'Certified' forest....the parent lumber company provided us with a 'Certification' certificate.....turns out that the parent Lumber Company had not submitted their certification process to the U.S. Green Building Council (and paid the accompanying fees) so the USGBC did not consider our 'Certified Forest' certificate as eligible for applicable LEED Credit.

36	More options: Lab and technical buildings & urban VS sub-urban
37	The computer interface with USGBC is very cumbersome - you never actually speak to a real person.
38	
39	keep it rigorous. If it become too easy it will not be worth anything. simplify the review process. Reduce the documentation requirements.
40	Recent experience with LEED 2.1 projects shows USGBC has improved the process over 2.0.
41	Documentation requirements (and time/fees associated with it) are often a deal breaker for clients who are decided whether to pursue LEED certification.
42	
43	USGBC must really streamline the documentation requirements. You can still design and build to meet LEED without going through the process of documentation. Many buildings are registering without an intention to complete the process.

Respondent Number	What was the most compelling reason for working toward LEED Certification for this project?
	Open-Ended Response
1	Prove it could be done.
2	As a pilot project, the XXX wanted to set a standard for future XXX projects.
3	To demonstrate that XXXX/Xxxx was sensitive to the communities environmental concerns
4	Embody environmental focus of the organization.
5	To contribute to the greater goal of sustainability.
6	best practices firm wide policy
7	committment to green building
8	Primary tenant a non-profit organization focusing on education and the environment
9	Owner requirement for this project.
10	Sustainable, lasting design with lower than average life cycle and maintenance costs.
11	Green building ar ehte right thing to do. Studies have shown that student performance is higher in these types of buildings.
12	The owner and project team were committed to design and construction of a sustainable building. The LEED certification process provided a third party certification tool to 'measure' the sustainable aspects of the project.
13	Sustainable building goals. When project was started, the LEED goals and credits seemed to be disirable and took commercial construction at least a 'notch' up and reinforced a mindset that created awareness of sustainability in the design and building process.
14	Mandated by Xxxxxxx City Council

15	XXX a government agency has a strong interest in sustainable design and has incorporated a mandate into its government design guide (the P-100) to strive to obtain a LEED silver rating on all new prospectus level construction projects (over 2.8 million dollars). XXX will operate these buildings for many years and wants them to be life cycle cost effective and sustainable.
16	Xxxxxxxxxxxxxx Xxxxxxxxxxxxxx Xxxxxx decided it was in their interest to certify all building construction where possible. This is an historic renovation
17	Improved product
18	stamp of legitimacy
19	Owner's request
20	High Ideals Core company values
21	The University wanted to set an example for students and the community.
22	Owners Directive
23	Owner is an MEP engineering firm. They pursued LEED Certification to demonstrate their acceptance of the program and ability to produce (design) LEED facilities.
24	Recognition for caring about the health of the occupants of the building. We are a healthcare organization.
25	Owner's desire to promote environmental responsibility.
26	the owner's vision to be environmentally responsible
27	City incentive funds coupled with grant for the non-profit architectural firm to justify cost of registration and documentation
28	Ensure high performance objectives were met, and to teach by example (this is a K12 school)
29	The entire team's commitment to sustainable adaptive use.
30	The original goal was not to obtain LEEDS certification. The owner had 2 goals, 50% reduction in utility costs and 25% recycled materials.
31	LEED certification has become a requirement within our agency for all new construction projects.
32	It was a school for Xxxxxxxxxxxxxx Xxxxxxxxxx
33	
34	POLITICAL
35	Our agency (XXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX XXXXXXXX XXXXXXXX) is under the U.S. Department of Commerce (DoC). The U.S. Department of Commerce was one of the original 'funders' to the U.S. Green Building Council to establish the LEED Process in the first place. The DoC 'encouraged' it's various agencies to try to qualify their new Projects for LEED so our Project Team adopted that mission.
36	Market Perception
37	The Owner was (is) interested in sustainable construction - energy efficiency, as well as setting a community example as an institution of higher learning
38	LEED certification is a County mandate required for all new County buildings. County has committment to environmental stewardship.
39	the credibility of being independently verified as truely being a green project by a recognized authority.
40	Foundation supports environmental programs; project certification was seen as setting a good example for other organizations/proujects.
41	It would have been good PR for the school.
42	Sustainable impact

43	The client believes the third party certification is important to them. Another client wants to pursue MD tax credits. A third client is highly dedicated to sustainability and has established LEED as a requirement for any commercial project in their 300 acre development. It's different for every client.
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Respondent Number	What was the most challenging difficulty or barrier encountered as part of the LEED certification process?
	Open-Ended Response
1	Lack of certainty regarding submittal requirements and level of effort accomplish them.
2	At the time, education of Design Team members and availability of products/technologies.
3	LEED decision made after plans / spec. were issued and the building was under construction. The site had been cleared, footings poured and the ground and first floor poured. LEED was a complete afterthought.
4	Reconciling the Platinum target with the budget and compiling the documentation were the largest barriers.
5	Budget problems for the Owner leading to a concern that LEED would 'scare off' bidders or 'cost more because of paperwork and uncertainty'.
6	getting owner to pay fees involved, first cost from mep
7	lack of clarify on LEED standards
8	some of the technical components didn't seem logical
9	Meeting LEED requirments and controlling project costs.
10	Capital cost control
11	Documenting all the credits. Especially the ones whic rely on receiving information from the contractor and or their subs.
12	The most challenging issue was the uncertainty of the LEED review process. As the process was still relatively new, there was little solid precedent for credit approval / denial out in the industry to use as a testing tool prior to submittal.
13	although LEED had verifiable intents, strategies and goals, there is not a good roadmap for getting there. LEED is especially more difficult on smaller projects and I believe proportionally higher costs. Many of the credits are a similar amount of work on either a 5,000 sf project or a 150,000 sf project.
14	The LEED process is not geared toward buildings on a campus with flucuating occupanies and pooled parking rather than parking designated for individual buildings.
15	There are many for a government project. initial cost of documenting the LEED requirements is one. Initial first cost of more energy efficient equipment is another. Federal projects have a tight budget and do not tolerate upgrades and improvements easily. There are also differences in our design standards that some argue make the LEED requirement for commissioning unnecessary for federal buildings. LEED is geared toward commercial big box office buildings not toward government facilities that often like courthouses and border facilities have specific purposes to serve. This is sometimes not recognized by the architects and engineers servicing on LEED review panals and committees.
16	the 2.1 Letter Template does not provide enough space in some credits to enter all data. Documentation collection is daunting but not impossible.
17	Documentation
18	Gathering the documentation from the contractor

19	Documentation & interpretations
20	Greedy uncooperative architect Xxxxxx Xxxxxxx of Xxxxxxx Xxxxxxxx who was disagreeable from the start. Greedy uncooperative Construction Manager Xxxxx Xxxxxxx of XXXX Construction who was also disagreeable from the start. Lack of management skills of the consultant, Xxxxxx Xxxxxxx who at the time worked for XXXXXXX. He left and turned the project over to Xxxx Xxxxxxxx who was clueless about the documentation requirements. We went to mediation / arbitration over the project. The mediator dismissed the LEEDs issue as irrelevant and the three arbitrator cared even less about the desire to achieve the certification. It was a wonderful intent that did not have the buy in of the architect or construction manager. Neither was my first choice to execute the project because of their lack of interest in LEEDs. I wanted XXXXX and Xxxxxxx Construction. But I was not in the position to make the final decision. When XXXX and XXXX were chosen I warned the president of the company that we faced a hard long uphill battle. That is why we hired the consultant. The two biggest issues with the consultant was the lack of management skills and the lack of getting the COMPLETE documentation as the job progressed. I think getting the documentation BEFORE the end of the job is critical to the success. I also feel the language in the contracts could have been stronger, although it was pretty clear.
21	Commissioning
22	Documenting our points
23	Documentation, as much of it was compiled after construction was completed.
24	Architect not wanting to do the LEED work they had agreed to do. It was time consuming and cost them significant money. Also, the added 'requirement' the we separately hire a LEEDs documentation consultant for an additional \$50,000 late in the project. This was a change from when we started in 2000.
25	Getting all critical parties involved in the project to fully understand and buy into the integrated design process
26	educating sub contractors that this was not the usual construction process nor product
27	XXXX – Xxxxxxxx xxxxxxxxx - project is housing for XXXXXxxx xxxxxxx
28	Determining which mix of high performance strategies fit within the construction budget and timeline.
29	Learning the LEED process. The Xxxxxxx Building was No. XXXX, and pretty much everything we were doing was new to the entire team and there were few CIRs or other resources to turn to for guidance.
30	When the owner decided to get certification after the project was completed.
31	For this particular project, the planning and funding was approved prior to the certification process becoming mandatory. Consequently, the project budget could not accommodate the additional costs associated with certification.
32	Getting timely information and documentation from the contractors
33	
34	COST
35	I think the most challenging part of this Project was adapting a 'standard' set of contract specifications to incorporate the various requirements contained in the LEED certification requirement process before the Contract Package was 'put on the street' for Bids. It's all well and good to set a 'target' for a Project's LEED Certification Level before the Design begins, but it's an entirely different story when you have to 'script' the verbage (actual wording/requirements) in the various areas of the Contract Specifications that will guarantee the Project grades out with it's LEED Point Total at the completion of the actual

	construction.
36	non-owner occupied building.....(Value to the market & cost per SF as compared to other options for lease.)
37	Educating Contractor/subcontractors on importance of compliance with specified LEED requirements Volume of documentation required (Version 1 Pilot Project)
38	The project type. Being a detention facility, security requirements made some LEED credits and green building strategies challenging.
39	the amount of time, cost and effort to properly document all the points
40	Lack of knowledge/understanding of LEED by project team members.
41	All parties were inexperienced with the LEED process.
42	Last minute decision to go for LEED certification, and the documentation process.
43	The cost of documentation is sometimes too much for the client to justify the expense. USGBC MUST control the documentation requirements from becoming too onerous. No design professional pursued their career path for the purpose of filling out binders of paperwork. We're more interested in designing high performance buildings than we are in spending hours and hours to prove performance.

Respondent Number	What external barriers (outside of your company) made the certification process difficult?
	Open-Ended Response
1	
2	
3	Lack of awareness on the part of materials suppliers
4	Existing codes & regulations prohibited some of the measures we wanted to implement and required significant time to overcome.
5	Money. When 'platinum' features were 'value engineered out' the Owner had less interest in spending money for the paperwork.
6	na
7	Team knowledge and understanding of LEED
8	Architects and engineers uneducated on LEED and expected to come up the learning curve on the owner's dollar!
9	Engineers understanding of the requirements for EA Credit 1.
10	Subcontractor committment.
11	Having to keep the sub-contractors inline when it came to changes they wanted to impliment.
12	None

13	LEED has been embraced for Federal, state and municipal projects and is now incorporated into many RFP, design/bid/build public projects and to moneyed non-profit projects or medium to high quality office building, but has not had much presence in neighborhood commercial centers. The lions share of construction has been (and continues to be) in those 5-15,000 sf projects by small owner/developers. More capacity building needs to happen with specialty subcontractors/ small general or design/build contractors and be available 'at street level'. LEED is in danger of being class associated (only public or moneyed projects) will be able to do LEED.
14	Within the general community, there is not enough familiarity and recognition of LEED to make it worthwhile. One can be a proponent of sustainable green design, without being a proponent of LEED with its seemingly endless documentation requirements.
15	Lack of construction contractors experienced with LEED or willing to refrain from loading costs on for attempts to comply with LEED requirements.
16	Some Team members were using standard means of thinking and operation that conflicted with green building goals.
17	general contractor and sub compliance with documentation
18	waiting for documentation to be produced by others
19	Dealing w/ engineering consultants unfamiliar with LEED approach & rationale
20	Uncooperative, greedy 'professionals'
21	Fewer vendors were on board in 2002 so documentation and products were harder to collect than later projects.
22	Lack of familiarity with the general contractor, their subs, and the material suppliers, especially with respect to documentation (i.e., pre/post recycled content). Some of the design disciplines were not familiar with LEED and found the required documentation to be onerous or not really on point.
23	
24	Lack of green power alternatives offered by the local utility at the earlier stages of the project.
25	
26	collecting supporting documentation from the contractor and his subs
27	none - this was a team effort from the beginning with commitment from all
28	project budget and non-flexible construction schedule
29	Contractor hostility, owner apathy, perceived cost implications.
30	Make sure everyone understands the project goals up front and waht certifications will be obtained. We could not produce all the documentation required since the project was completed when it was decided to obtain LEEDS certification.
31	None in particular. The construction suppliers industry seems to be in the front, and he contractor base is rapidly gaining expertise.
32	Getting required documentation from contractors. Was a problem on this project continues to be a problem on all other LEED projects I have worked on. Construction schedules have become so tight construction managers in field are allowing contractors to proceed without proper documentaion in place.
33	
34	

35	If anything, it was educating the eventual successful Construction Contractor and their subs concerning the importance of obtaining the LEED Certification and the paperwork requirements they were required to document contained in the Contract Specifications they had previously bid.....once they were on board with the xxxxxxxx Project Team's goal of LEED Certification, things went pretty smoothly.
36	Market
37	As before - Contractor education.
38	Lack of communication and attention by/between design team members.
39	resistance from the owner's construction dept resistance from the contractor
40	Lack of education about LEED requirements within team. Delays in completing documentation by some team members made process management tiresome.
41	Lack of knowledge of LEED requirements and lack of willingness to challenge 'standard practice' by owner, design consultants & contractor.
42	
43	Construction markets are still behind the curve. Many points are lost in construction because a lack of dedication on the part of the contractor. Schedule-driven construction makes it easy for an owner to have to agree to sacrifice credits.

Respondent Number	What internal barriers (within your company) made the certification process difficult?
	Open-Ended Response
1	
2	
3	Cost concerns.
4	Concern that it cost too much; as a very early project (#8 overall), value of certification not actually appreciated (even less than it is presently).
5	None
6	na
7	long time line and project managment
8	none -- has 100% support
9	Hours required to monitor LEED design criteria and assemble documentation for submittals.
10	Documentation
11	Staff education on green ideas. However now that we have gone thru this once we expect it to improve.
12	None
13	LEED and sustainable building still remains cost driven. Resources for small projects are still meager.
14	When the budget was first developed for this project, LEED was not a mandate. It became a mandate later.
15	Finance and budget barriers and lack of knowledge by project managers as to LEED process and requirements
16	

17	running out of fee to chase General contractor for documentation
18	
19	N/A
20	Those with more authority than I ignored my advice.
21	No consideration for increased work load required to learn the LEED guidelines and research each credit for optimum performance/life cycle cost.
22	None. Our company was whole-heartedly into getting the LEED certification.
23	All levels of the organization did not hold the same beliefs or convictions relative to LEED Certification.
24	No financial incentives to pursue the designation. We are two points away from achieving a LEEDs standard, but those two points were going to cost \$85,000. These two points wouldn't have improved the environment at all. We hoped to be an example to others, but to waste \$85,000 for a piece of paper began to make me look stupid.
25	
26	its a lot of work
27	not applicable
28	learning curve for completing the documentation
29	Senior management who don't fully support LEED Certification, either through ignorance or active opposition.
30	Educating everyone about LEED's
31	For this particular project, the transition between funding approval and the LEED certification mandate.
32	On this project it was inconsistency of project team members. On most projects since it has been late commitment (post DD) for LEED Certification. LEED Documentation budget often used up by design team because of late commitment. LEED Certification application often started near building completion and there is no budget left internally to do the work.
33	
34	
35	None really.
36	none
37	Cost constraints in materials and systems for the building.
38	
39	time and cost involved in documenting points
40	This was the first LEED project we'd worked on - hence a learning experience for all.
41	Lack of an established collection of resources and experience with LEED.
42	timeline priorities. Hire a consultant to be responsible for the process, or include in the bid specs.
43	The company that I work for is a charter member of USGBC. There are no internal barriers!